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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
AN, SHAWN S

ART UNIT	PAPER NUMBER
2613	

DATE MAILED: 01/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/541,141	ZENG, WENJUN
	Examiner	**Art Unit**	
	Shawn S. An	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *16 November 2005*.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-31* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☒ Claim(s) *18,19 and 28-31* is/are allowed.

6) ☒ Claim(s) *1-9,11-14 and 20-27* is/are rejected.

7) ☒ Claim(s) *10 and 15-17* is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Remarks

1.   Applicant's remarks as filed on 11/16/05 with respect to claims 1-31 have been carefully considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3.   Claims 9 and 11-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee (6,226,050 B1) in view of Chien et al (5,621,467).

Regarding claim 9, Lee discloses a method of processing a decompressed image comprising the steps of:

selecting a block of image pixels for filtering as a function of Q parameter (step) and a Q parameter threshold (col. 3, lines 39-46);

establishing a filtering axis aligned parallel to a direction (Fig. 2); and

identifying a filtering segment comprising a plurality of pixels arrayed substantially parallel to the filtering axis and intersected by a boundary of the block, and

selectively filtering a plurality of pixels of the filtering segment (Fig. 2; col. 3, lines 27-56).

Lee does not seem to particularly disclose detecting an approximate direction of an image edge in a block of image pixels.

However, Chien et al teaches a method of processing a decompressed image (Fig. 2, 26; Fig. 3, 34) comprising detecting a direction of an image edge in a block of image pixels (col. 4, lines 38-43) for reducing artifacts in the presence of motion, through images with no motion, and images with significant motion (col. 4, lines 52-56).

Therefore, it would have been considered quite obvious to a person of ordinary skill in the relevant art employing the Lee's reference to incorporate the concept of detecting a direction of an image edge in a block of image pixels as taught by Chien et al so as to detect an approximate direction of an image edge in a block of image pixels for reducing artifacts in the presence of motion, through images with no motion, and images with significant motion.

Regarding claim 11, Lee discloses designating the filtering segment subject to filtering if a pair of pixels of the filtering segment adjacent to the boundary satisfies the predetermined relationship to a threshold (col. 3, lines 39-46).

Regarding claim 12, Lee discloses comparing the absolute value of the calculated gradient with a threshold (variable, comprising low and/or high) (col. 1, lines 44-50; col. 3, lines 39-46).

Therefore, it is considered an obvious design choice to compare difference of pixels as is well known in the art with the upper and/or lower boundary since the purpose of comparison is substantially the same.

Regarding claim 13, Lee discloses a lower threshold comprising a function of a quantization parameter (step) applicable to the block (col. 3, lines 39-46).

Regarding claim 14, Lee discloses designating at least one pixel on each side of the boundary as a filtering range (Fig. 2), and filtering the pixels of the filtering range col. 3, lines 27-56).

4.   Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (6,226,050 B1) in view of Simpson (5,754,702) and Chien et al (5,621,467).

Regarding claim 1, Lee discloses a method of processing a decompressed image comprising the steps of:

establishing a filtering axis aligned parallel to a direction (Fig. 2);

selectively filtering a plurality of pixels arrayed substantially parallel to the filtering axis (col. 3, lines 27-56).

Lee does not particularly disclose the image edge and the filter axis being not parallel to the horizontal and vertical orientation of the image (diagonal filtering), and detecting an approximate direction of an image edge in a block of image pixels.

However, utilizing diagonal filtering is well known in the art.

Furthermore, Simpson teaches decomposition of image data comprising horizontal, vertical, and diagonal filters (Fig. 3).

Moreover, Chien et al teaches a method of processing a decompressed image (Fig. 2, 26; Fig. 3, 34) comprising detecting a direction of an image edge in a block of image pixels (col. 4, lines 38-43) for reducing artifacts in the presence of motion, through images with no motion, and images with significant motion (col. 4, lines 52-56).

Therefore, it would have been considered quite obvious to a person of ordinary skill in the relevant art employing the Lee's reference to incorporate the diagonal filters as taught by Simpson so as to completely (thoroughly) filter the blocks in order to reduce blockiness or artifacts, and also incorporate the concept of detecting a direction of an image edge in a block of image pixels as taught by Chien et al so as to detect an approximate direction of an image edge in a block of image pixels for reducing artifacts in the presence of motion, through images with no motion, and images with significant motion.

Regarding claim 2, Lee discloses identifying a first and a second pixel located on a projection parallel to a candidate axis, the first/second pixels located in a vicinity of a first/second boundary of the block (Fig. 2, C, D);

comparing the first and second pixels, and repeating above steps for candidate axis, and designating the filtering axis having a predefined relationship to corresponding comparisons for other candidate axes (col. 3, lines 27-56).

Regarding claim 3, the Examiner takes official notice that computing mean of a difference is well known in the art. Therefore, it would have been considered quite obvious to compute the minimum of a mean of a difference between the first and the second pixels. Note: see Kim (6,594,400).

Regarding claims 4 and 8, Lee discloses designating pixels to be subject to filtering if a comparison of pixels adjacent to a boundary of the block satisfies a predetermined relationship, identifying at least one pixel on each side of the boundary as a filtering range by comparing pairs of pixels further removed from the boundary to a threshold, and selectively filtering the pixels of the filtering range (col. 1, lines 58-61; col. 3, lines 27-38).

Regarding claims 5-6, Lee discloses comparing the absolute value of the calculated gradient with a threshold (variable, comprising low and/or high) (col. 1, lines 44-50; col. 3, lines 39-46).

Therefore, it is considered an obvious design choice to compare difference of pixels as is well known in the art with the upper and/or lower boundary since the purpose of comparison is substantially the same.

Regarding claim 7, Lee discloses a lower threshold comprising a function of a quantization parameter (step) applicable to the block (col. 3, lines 39-46).

5.   Claims 20-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (6,226,050 B1) in view of Borer (6,069,670) and Chien et al (5,621,467).

Regarding claim 20, Lee discloses all of the claimed limitation (see above) with the exception of filtering first and the second <u>interlaced fields</u>, and detecting an approximate direction of an image edge in a block of image pixels.

However, Borer teaches a progressive <u>image</u> by requiring filtering of each interlaces fields separately using filters and then summing the results (col. 12, lines 15-23).

Furthermore, Chien et al teaches a method of processing a decompressed image (Fig. 2, 26; Fig. 3, 34) comprising detecting a direction of an image edge in a block of image pixels (col. 4, lines 38-43) for reducing artifacts in the presence of motion, through images with no motion, and images with significant motion (col. 4, lines 52-56).

Therefore, it would have been considered obvious to a person of ordinary skill in the relevant art employing the Lee's reference to incorporate the Borer's teaching as above so as to selectively filter the block of the interlaced fields parallel to the filtering axis in order to reduce blockiness or artifacts, and also incorporate the concept of detecting a direction of an image edge in a block of image pixels as taught by Chien et al so as to detect an approximate direction of an image edge in a block of image pixels for reducing artifacts in the presence of motion, through images with no motion, and images with significant motion.

Regarding claim 21, Lee discloses identifying a first and a second pixel located on a projection parallel to a candidate axis, the first/second pixels located in a vicinity of a first/second boundary of the block (Fig. 2, C, D); and

comparing the first and second pixels, and repeating above steps for candidate axis, and designating the filtering axis having a predefined relationship to corresponding comparisons for other candidate axes (col. 3, lines 27-56).

Regarding claim 22, the Examiner takes official notice that computing mean of a difference is well known in the art. Therefore, it would have been considered quite obvious to compute the minimum of a mean of a difference between the first and the second pixels. Note: see Kim (6,594,400).

Regarding claims 23 and 27, Lee discloses designating pixels to be subject to filtering if a comparison of pixels adjacent to a boundary of the block satisfies a predetermined relationship, identifying at least one pixel on each side of the boundary as a filtering range by comparing pairs of pixels further removed from the boundary to a threshold, and selectively filtering the pixels of the filtering range (col. 1, lines 58-61; col. 3, lines 27-38).

Regarding claims 24-25, Lee discloses comparing the absolute value of the calculated gradient with a threshold (variable, comprising low and/or high) (col. 1, lines 44-50; col. 3, lines 39-46).

Therefore, it is considered an obvious design choice to compare difference of pixels as is well known in the art with the upper and/or lower boundary since the purpose of comparison is substantially the same.

Regarding claim 26, Lee discloses a lower threshold comprising a function of a quantization parameter (step) applicable to the block (col. 3, lines 39-46).

Allowable Subject Matter

6.   Claims 10 and 15-17 are objected to as being dependent upon a rejected base claim 9, but would be allowable: if either one of claim 10 or claim 15 is rewritten in independent form including all of the limitations of the base claim 9 and any intervening claims.

Dependent claim 10 recites the novel features comprising the steps of:

A) designating a plurality of candidate axis;

B) identifying a first and a second pixel located on a projection parallel to a candidate axis, the first/second pixels located in a vicinity of a first/second boundary of the block;

C) determining a difference between the first and the second pixel;

D) repeating the above steps B) and C) for the plurality of axis;

E) identifying as the filtering axis the candidate axis corresponding to a function of a minimum difference between the first and the second pixels.

Dependent claims 15-17 recite the novel features comprising the steps of:

A) selecting a pixel of the filtering segment adjacent to the boundary for inclusion in the filtering range, and

B)   successively including in the filtering range a next contiguous pixel until a difference between a last pixel included in the filtering range and the next contiguous pixel exceeds a continuity threshold.

Accordingly, if the amendments are made to the claims listed above, and if rejected claims are canceled, the application would be placed in condition for allowance.

7.   Claims 18-19 and 28-31 are allowed as having contained the allowable subject matter.

8.   Claims 18-19 and 28-31 recite novel features/method of post processing a decompressed image.

The art of record fails to anticipate or make obvious the novel features as specified in these claims.

Conclusion

9.   Any inquiry concerning this communication or earlier communications from the Examiner should be directed to *Shawn S An* whose telephone number is 571-272-7324.

10.   The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Please note the new fax number.

11.   Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SHAWN AN
PRIMARY EXAMINER

1/11/06